

What is claimed is:

- 1                   1.     A storage apparatus comprising:  
2                   a gateway, having a processor, a memory, and at least one port operative to  
3 connect to an external network;  
4                   at least one of a plurality of devices that store information, each of said  
5 devices further comprising at least one of a plurality of volumes;  
6                   a server;  
7                   a switch; and  
8                   an internal network connecting said gateway, said server, said switch, and  
9 said at least one of a plurality of devices that store information; wherein  
10                  said gateway receives a data packet for storing, and thereupon searches in  
11 said memory for a virtual destination address retrieved from said data packet, and  
12 thereupon reads from said memory a corresponding destination address for a particular  
13 one of said at least one of a plurality of devices that store information, and thereupon  
14 replaces in said data packet said virtual destination address with said corresponding  
15 destination address from said memory.
- 1                   2.     The apparatus of claim 1, wherein said gateway authenticates a  
2 source of said data packet based upon a user address in said data packet.
- 1                   3.     The apparatus of claim 1, wherein said external network comprises  
2 a virtual private network (VPN), and wherein said gateway performs VPN processing for  
3 said data packet.
- 1                   4.     The apparatus of claim 1, wherein said external network uses a first  
2 protocol and said internal network uses a second protocol, and wherein said gateway  
3 translates said data packet from said first protocol to said second protocol.
- 1                   5.     The apparatus of claim 4, wherein said first protocol comprises at  
2 least one of IP protocol, ATM, and Fibre channel.
- 1                   6.     The apparatus of claim 4, wherein said second protocol comprises  
2 at least one of IP protocol, ATM, and Fibre channel.

1                   7.       The apparatus of claim 1, wherein said gateway searches in said  
2 data packet for a command and a virtual private volume identifier, and if found,  
3 thereupon searches in said memory for a volume identifier corresponding to said virtual  
4 private volume identifier, and thereupon replaces said virtual private volume identifier in  
5 said data packet with said volume identifier.

1                   8.       The apparatus of claim 1, wherein said gateway receives a data  
2 packet being sent to said external network, and thereupon searches in said memory for a  
3 destination address retrieved from said data packet, and thereupon reads from said  
4 memory a corresponding virtual destination address from said memory, and thereupon  
5 replaces in said data packet said destination address with said corresponding virtual  
6 destination address from said memory.

1                   9.       The apparatus of claim 1, wherein said virtual destination address  
2 and said destination address are stored in a table.

1                   10.     A storage apparatus comprising:  
2                   a server, having a processor, a memory, and at least one port operative to  
3 connect to an external network;  
4                   at least one of a plurality of devices that store information, each of said  
5 devices further comprising at least one of a plurality of volumes;  
6                   a switch; and  
7                   an internal network connecting said server, said switch, and said at least  
8 one of a plurality of devices that store information; wherein  
9                   said server receives a data packet for storing, and thereupon searches in  
10 said memory for a virtual destination address retrieved from said data packet, and  
11 thereupon reads from said memory a corresponding destination address for a particular  
12 one of said at least one of a plurality of devices that store information, and thereupon  
13 replaces in said data packet said virtual destination address with said corresponding  
14 destination address from said memory.

1                   11.     The apparatus of claim 10, further comprising a gateway, said  
2 gateway having a processor, a memory, and at least one port operative to connect to an  
3 external network, and wherein said external network uses a first protocol and said internal

4 network uses a second protocol, and wherein said gateway translates said data packet  
5 from said first protocol to said second protocol.

1 12. The apparatus of claim 11, wherein said first protocol comprises at  
2 least one of IP protocol, ATM, and Fibre channel.

1 13. The apparatus of claim 11, wherein said second protocol comprises  
2 at least one of IP protocol, ATM, and Fibre channel.

1 14. The apparatus of claim 11, wherein said external network  
2 comprises a virtual private network (VPN), and wherein said gateway performs VPN  
3 processing for said data packet.

1 15. The apparatus of claim 10, wherein said server searches in said  
2 data packet for a command and a virtual private volume identifier, and if found,  
3 thereupon searches in said memory for a volume identifier corresponding to said virtual  
4 private volume identifier, and thereupon replaces said virtual private volume identifier in  
5 said data packet with said volume identifier.

1 16. The apparatus of claim 10, wherein said server receives a data  
2 packet being sent to said external network, and thereupon searches in said memory for a  
3 destination address retrieved from said data packet, and thereupon reads from said  
4 memory a corresponding virtual destination address from said memory, and thereupon  
5 replaces in said data packet said destination address with said corresponding virtual  
6 destination address from said memory.

1 17. The apparatus of claim 10, wherein said server authenticates a  
2 source of said data packet based upon a user address in said data packet.

1 18. A storage apparatus comprising:  
2 a switch, having a processor, a memory, and at least one port operative to  
3 connect to an external network;  
4 at least one of a plurality of devices that store information, each of said  
5 devices further comprising at least one of a plurality of volumes;  
6 a server; and

7           an internal network connecting said server, said switch, and said at least  
8 one of a plurality of devices that store information; wherein  
9           said switch receives a data packet for storing, and thereupon searches in  
10 said memory for a virtual destination address retrieved from said data packet, and  
11 thereupon reads from said memory a corresponding destination address for a particular  
12 one of said at least one of a plurality of devices that store information, and thereupon  
13 replaces in said data packet said virtual destination address with said corresponding  
14 destination address from said memory.

1           19.   The apparatus of claim 18, further comprising a gateway, said  
2 gateway having a processor, a memory, and at least one port operative to connect to an  
3 external network, and wherein said external network uses a first protocol and said internal  
4 network uses a second protocol, and wherein said gateway translates said data packet  
5 from said first protocol to said second protocol.

1           20.   The apparatus of claim 19, wherein said first protocol comprises at  
2 least one of IP protocol, ATM, and Fibre channel.

1           21.   The apparatus of claim 19, wherein said second protocol comprises  
2 at least one of IP protocol, ATM, and Fibre channel.

1           22.   The apparatus of claim 19, wherein said external network  
2 comprises a virtual private network (VPN), and wherein said gateway performs VPN  
3 processing for said data packet.

1           23.   The apparatus of claim 18, wherein said switch searches in said  
2 data packet for a command and a virtual private volume identifier, and if found,  
3 thereupon searches in said memory for a volume identifier corresponding to said virtual  
4 private volume identifier, and thereupon replaces said virtual private volume identifier in  
5 said data packet with said volume identifier.

1           24.   The apparatus of claim 18, wherein said switch receives a data  
2 packet being sent to said external network, and thereupon searches in said memory for a  
3 destination address retrieved from said data packet, and thereupon reads from said  
4 memory a corresponding virtual destination address from said memory, and thereupon

5 replaces in said data packet said destination address with said corresponding virtual  
6 destination address from said memory.

1                   25.     The apparatus of claim 18, wherein said switch authenticates a  
2 source of said data packet based upon a user address in said data packet.

1                   26.     A storage apparatus comprising:  
2                   at least one of a plurality of devices that store information, each of said  
3 devices further comprising at least one of a plurality of volumes, a processor, a memory,  
4 and at least one port operative to connect to an external network;  
5                   a switch;  
6                   a server; and  
7                   an internal network connecting said server, said switch, and said at least  
8 one of a plurality of devices that store information; wherein  
9                   said at least one of a plurality of devices that store information receives a  
10 data packet for storing, and thereupon searches in said memory for a virtual destination  
11 address retrieved from said data packet, and thereupon reads from said memory a  
12 corresponding destination address for a particular one of said at least one of a plurality of  
13 devices that store information, and thereupon replaces in said data packet said virtual  
14 destination address with said corresponding destination address from said memory.

1                   27.     The apparatus of claim 26, further comprising a gateway, said  
2 gateway having a processor, a memory, and at least one port operative to connect to an  
3 external network, and wherein said external network uses a first protocol and said internal  
4 network uses a second protocol, and wherein said gateway translates said data packet  
5 from said first protocol to said second protocol.

1                   28.     The apparatus of claim 27, wherein said first protocol comprises at  
2 least one of IP protocol, ATM, and Fibre channel.

1                   29.     The apparatus of claim 27, wherein said second protocol comprises  
2 at least one of IP protocol, ATM, and Fibre channel.

1                   30.     The apparatus of claim 27, wherein said external network  
2 comprises a virtual private network (VPN), and wherein said gateway performs VPN  
3 processing for said data packet.

1           31. The apparatus of claim 26, wherein said at least one of a plurality  
2 of devices that store information searches in said data packet for a command and a virtual  
3 private volume identifier, and if found, thereupon searches in said memory for a volume  
4 identifier corresponding to said virtual private volume identifier, and thereupon replaces  
5 said virtual private volume identifier in said data packet with said volume identifier.

1           32. The apparatus of claim 26, wherein said at least one of a plurality  
2 of devices that store information receives a data packet being sent to said external  
3 network, and thereupon searches in said memory for a destination address retrieved from  
4 said data packet, and thereupon reads from said memory a corresponding virtual  
5 destination address from said memory, and thereupon replaces in said data packet said  
6 destination address with said corresponding virtual destination address from said  
7 memory.

1           33. The apparatus of claim 26, wherein said at least one of a plurality  
2 of devices that store information authenticates a source of said data packet based upon a  
3 user address in said data packet.

1           34. A method for managing storage, comprising:  
2 receiving a data packet;  
3 searching for a virtual destination address retrieved from said data packet;  
4 reading a corresponding destination address for a particular one of at least  
5 one of a plurality of devices that store information; and  
6 replacing in said data packet said virtual destination address with said  
7 corresponding destination address.

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